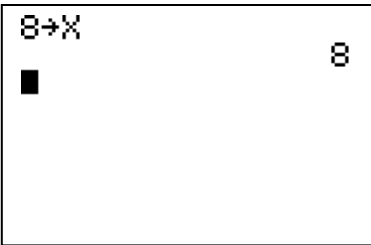
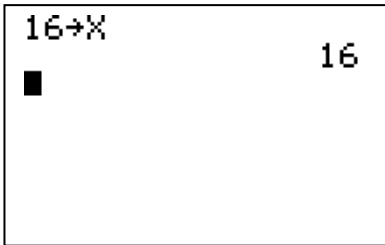
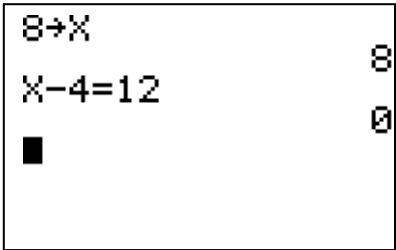
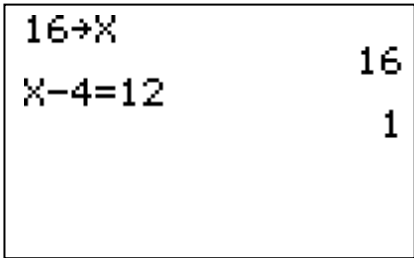


# SOLVING LINEAR EQUATIONS WITH THE TI-84+

## 1. Test to Check Solution to a Linear Equation

**Example: Solve  $x - 4 = 12$  Two scenarios**

<p>Suppose the student solves (incorrectly) to find <math>x = 8</math>.</p> <p>Type <b>8</b> <b>STO&gt;</b> <b>X,T,θ,n</b> <b>ENTER</b></p> <p>Screen: </p>	<p>Suppose the student solves (correctly) to find <math>x = 16</math>.</p> <p>Type <b>1</b> <b>6</b> <b>STO&gt;</b> <b>X,T,θ,n</b> <b>ENTER</b></p> <p>Screen: </p>
<p>Type in equation: <math>x - 4 = 12</math> Then <b>ENTER</b></p> <p>To get the = sign: <b>2nd</b> <b>MATH</b> <b>1</b></p> <p>Screen: </p>	<p>Type in equation: <math>x - 4 = 12</math> Then <b>ENTER</b></p> <p>To get the = sign: <b>2nd</b> <b>MATH</b> <b>1</b></p> <p>Screen: </p>
<p>The calculator returns the value "0" because the solution does not satisfy the equation. The "0" means that the statement is FALSE when the value for <math>x</math> (in this case, 4) is substituted into the equation.</p>	<p>The calculator returns the value "1" because the solution satisfies the equation. The "1" means that the statement is TRUE when the value for <math>x</math> (in this case, 16) is substituted into the equation.</p>
<p>The student will review his work and determine his error.</p>	<p>The student receives affirmation that his procedures are correct.</p>

## 2. Using Tables

### Manually




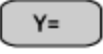
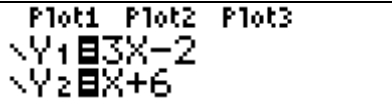




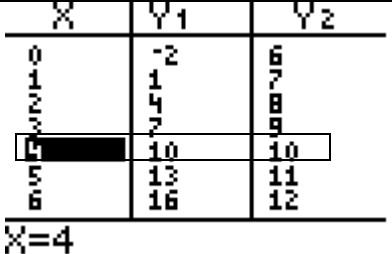
Before you begin to do any work on the calculator, show how the members of the equation change as  $x$  takes different values. Construct the table of values with these columns: variable, left member of equation, right member of equation.

Example:  $3x - 2 = x + 6$ .

Calculate the value of each member of the equation for the entered value of  $x$ . Select an initial value for  $x$  that is close to but smaller than the solution to the equation. (When you use tables on the calculator, it won't matter where you start; you can scroll both backwards and forwards.)

variable	Left side of equation	Right side of equation
$x$	$3x - 2$	$x + 6$
0	-2	6
1	1	7
2	4	8
3	7	9
4	10	10

### Use the table function of the calculator

Press   to get TBLSET. For TblStart enter the same value of $x$ that you used to start your table above (0), leave $\Delta Tbl = 1$ for now.	
Press  and type the left side of the equation in $y_1$ and the right side of the equation on $y_2$ .	
Press   to get to TABLE. Peruse the values in columns labeled $y_1$ and $y_2$ . With the cursor on the $x$ -column, press  or  to scroll down or up the table until you see that the values in $y_1$ and $y_2$ are equal on the same row.	
Note: This is harder when the solution is a fraction. You'll have to change $\Delta TBL$ and you still might only get an approximation	

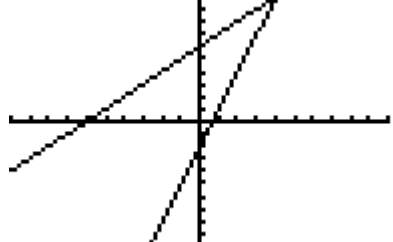
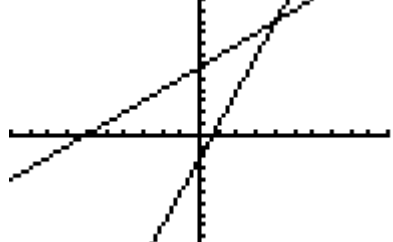
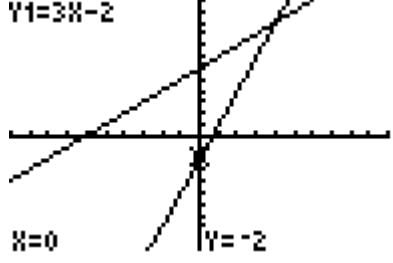
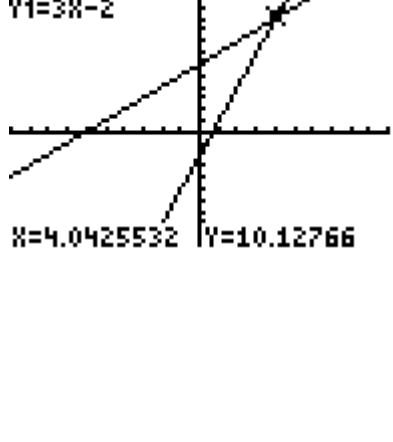
### 3. Graphing each side of the linear equation as a linear function

Help students develop an understanding of why these equations are called linear equations by **graphing each member as a linear function** and looking for the x-coordinate(s) on the graph where the two lines **intersect**.

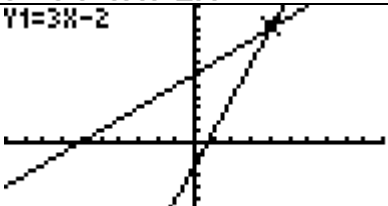
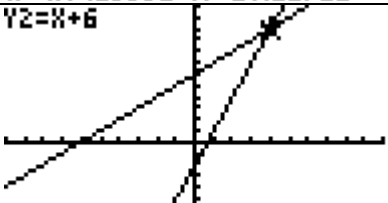
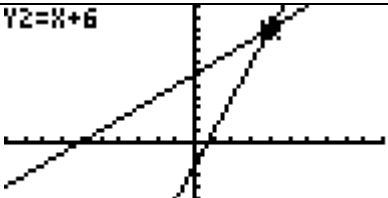
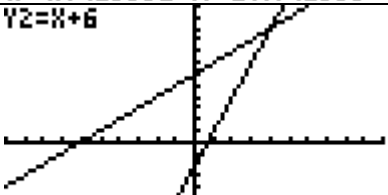
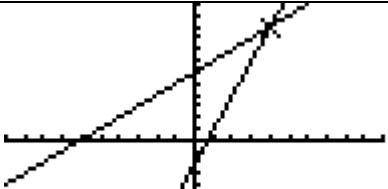
Essentially, the model for this procedure involves the transitive property of equality:

$$\begin{array}{ccc} 3x - 2 & = & x + 6 \\ \parallel & & \parallel \\ y_1 & = & y_2 \end{array}$$

Note: In this model, students must understand that the y-coordinate for each expression represents the value of that side of the equation when the x-coordinate is substituted in place of the variable.

We already have the two members of the equation entered as linear functions in <b>Y=</b> .	<div>Plot1 Plot2 Plot3</div> <div>Y1=3X-2</div> <div>Y2=X+6</div>
Press <b>ZOOM</b> <b>6</b> to get a standard widow from -10 to 10 on both the x-axis and the y-axis. Press <b>GRAPH</b>	
Note: The viewing window may have to be adjusted if the intersection of the two lines is not visible.  Press <b>WINDOW</b> and change <b>yMAX</b> to 12.	
Press <b>TRACE</b> to show values of the function as you move the cursor left and right. If the FORMAT has all of the items on the left highlighted, the member of the equation will be printed at the upper left of the screen. The values of the coordinates of the current location of the cursor are shown at the bottom of the screen.	
Use <b>TRACE</b> and move the cursor left/right to the point where the two lines intersect. Estimate the x-value at the point where both lines have the same y-value. Without a 'friendly window' you might not be able to place the cursor directly on that point. Right now the point of intersection seems to be (4, 10). Remember the x-coordinate, 4, is the x-value in the equation and the y-coordinate is the value of each side of the equation when the x = 4. We will use another function of the calculator to actually get x = 4 to show on the screen.	

#### 4. Use the intersect function of the calculator.

Press <b>2nd</b> <b>TRACE</b> to get to CALC.	<b>CALCULATE</b> 1:value 2:zero 3:minimum 4:maximum <b>5:intersect</b> 6:dy/dx 7:∫f(x)dx
Press <b>5</b>	$Y1=3X-2$  First curve? $X=4.0425532$ $Y=10.12766$
The calculator asks you to tell it which pair of functions you want to use to find the intersection. If it shows you the left side (First curve) of the equation you want, press <b>ENTER</b>	$Y2=X+6$  Second curve? $X=4.0425532$ $Y=10.042553$
Repeat process for the second member of the equation you want using the down cursor to get to the correct other member of the equation.	$Y2=X+6$  Guess? $X=4.0425532$ $Y=10.042553$
Next, guess at the x-coordinate of the intersection and press the numbers that represent that value  (Or you can place the cursor as close to the intersection of the two functions as you can.)	$Y2=X+6$  Guess? $X=4$
Press <b>ENTER</b> and the calculator will show the x-coordinate and the y-coordinate of the point of intersection. Remember the x-value is the solution to the equation and the y-value is the value that each side of the equation has when that x-value is put back into the original equation.	 Intersection $X=4$ $Y=10$